

CLAIMS

1. An imaging apparatus, comprising:
 - a three-dimensional substrate in which a partition wall having an
 - 5 opening at a central portion is formed so as to cross an inner cavity;
 - an optical filter that is fixed on a first flat surface of both surfaces of the partition wall so as to cover the opening;
 - a semiconductor imaging device that is face-down mounted on a second
 - flat surface of the partition wall with an imaging area facing the opening; and
 - 10 an optical system for forming images that is installed on a side of the optical filter in the inner cavity of the three-dimensional substrate,
 - the opening of the partition wall being closed on both sides with the optical filter and the semiconductor imaging device so as to form a cavity,
 - wherein an air passage for allowing communication between the cavity
 - 15 and an exterior of the three-dimensional substrate is formed on the first flat surface, and has a labyrinth structure that causes a flow rate of air passing through the air passage to vary depending on a location in the air passage.
2. The imaging apparatus according to claim 1,
 - 20 wherein the labyrinth structure of the air passage is defined by a zigzag shape, a shape inclined as a whole or a circular-arc shape.
3. The imaging apparatus according to claim 1 or 2,
 - wherein the labyrinth structure of the air passage is formed by providing
 - 25 a rib crossing the air passage so that a height of the air passage in a thickness direction of the optical filter varies along a flow direction of the air passage.
4. The imaging apparatus according to any one of claims 1 to 3,
 - wherein the labyrinth structure of the air passage is formed by providing
 - 30 a concave part on a side edge of the air passage so that a width of the air passage

within the first flat surface varies along the flow direction of the air passage.

5. The imaging apparatus according to claim 1,

5 wherein the three-dimensional substrate has such a low light transmittance with respect to a region sensitive to light reception by the semiconductor imaging device that substantially no unwanted signal is generated.

6. The imaging apparatus according to claim 1,

10 wherein the air passages are located at a position axisymmetric with respect to the opening in the three-dimensional substrate.

7. A method for manufacturing an imaging apparatus that uses a

15 three-dimensional substrate in which a partition wall having an opening at a central portion is formed so as to cross an inner cavity, an air passage with a non-linear structure for allowing communication between the opening and an exterior of the three-dimensional substrate is formed on a first flat surface of both surfaces of the partition wall, and a conductor land for connection is provided on a second flat surface of the partition wall, comprising process steps of:

20 fixing an optical filter on the first flat surface by bonding;
installing a semiconductor imaging device with respect to the conductor land for connection provided on the second flat surface;

sealing the semiconductor imaging device; and

subsequently installing an optical system for forming images in the inner cavity of the three-dimensional substrate.